

## Integration of Phytogreen for Heavy Metal Removal From Wastewater

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### ABSTRACT

Although the oxidation pond process for the treatment of wastewater has been widely studied and commercial application has already been recognized, the integration of the phytogreen system has yet to be studied. This work was focused on investigating the improvement in the conventional oxidation pond process produced by the integrated phytogreen system for the treatment of wastewater. Among the conventional treatment systems, the phytogreen integrated oxidation pond process appears to be an efficient system, affecting the bio-removal of heavy metals. The influence of the integrated phytogreen system, including two different aquatic plants (*Typha angustifolia* sp. and *Limnocharis flava* sp.) in the conventional oxidation pond process, was investigated for a retention time of 13 days. The results revealed that the integrated phytogreen system realized the maximum removal of copper to 79.07%, magnesium to 68%, cadmium to 61.07%, chromium to 69.17%, nickel to 74.87%, iron to 81.17%, lead to 62.07% and zinc to 63% at a retention time of 13 days when the two plant species were combined together. A positive relation between retention time and heavy metal removal was studied, and it was confirmed by the negative and significant correlation coefficients of the corresponding heavy metals with retention period. The results revealed that the integrated phytogreen system consisting of two different aquatic plants (*T. angustifolia* sp. and *Limnocharis flava* sp.) in the conventional oxidation pond process is a reliable and ecologically attractive option. Finally, integration of phytogreen is proposed to minimize heavy metal contamination in wastewater.

**KEYWORDS:** Retention time; Wastewater; Phytogreen; Heavy metal removal

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